

What is claimed is:

1. ~~A method for stabilizing adjacent vertebrae of a spine, comprising implanting an arcuate fixation member between the vertebrae.~~
2. ~~The method of claim 1 wherein the member is implanted through a pre-formed aperture in each of the adjacent vertebrae.~~
3. ~~The method of claim 1 wherein the preformed aperture has been drilled in each of the adjacent vertebrae.~~
4. ~~The method of claim 1 wherein apparatus the fixation member is the sole apparatus employed to affix the vertebrae.~~
5. ~~The method of claim 1 wherein the member is made from one or more of a metal, bone, morphogenic protein, carbon fiber composite, nitinol, a biodegradable material, collagen or collagen coated metal or bone.~~
6. ~~The method of claim 1 wherein the implant is one of solid, hollow or with ingrowth fenestrations and screw holes or expansion bolts or staples.~~
7. A method for stabilizing adjacent vertebrae of a spine, comprising:
providing a positioning apparatus including two guide sleeves, each guide sleeve having a long axis;
locating the two guide sleeves with respect to the adjacent vertebrae such that a vertex formed by the long axis of each guide sleeve is located in the intervertebral space for the adjacent vertebrae;
forming an aperture in each of the adjacent vertebrae using the guide sleeves;
and

inserting an implant into the apertures formed in each of the adjacent vertebrae so that the implant extends between the adjacent vertebrae and through the intervertebral space.

8. The stabilizing method of claim 7 wherein said step of forming includes forming an arcuate aperture in each of the adjacent vertebrae such that the arcuate apertures in the adjacent vertebrae have a common axis of rotation.

9. The stabilizing method of claim 7 wherein the step of forming includes forming an aperture in each of the adjacent vertebrae by one of drilling or ablation of the bone by an energy source.

10. The stabilizing method of claim 8 wherein the step of forming includes forming an aperture in each of the adjacent vertebrae by one of drilling or ablation of the bone by an energy source.

11. The stabilizing method of claim 8 wherein the step of forming includes:

drilling an initial aperture in each of the adjacent vertebrae so as to create intersecting apertures with convergent paths within the intervertebral space; and
enlarging the initial aperture so as to form the aperture that receives the implant.

12. The stabilizing method of claim 11 wherein the step of enlarging includes enlarging the initial aperture using one of a drill bit, a reamer, an awl, coring device or energy source.

13. The stabilizing method of claim 11 wherein the method of forming further includes inserting a drill bit into each of the guide sleeves for drilling of the initial aperture.

14. The stabilizing method of claim 11 wherein the step of forming further includes;

inserting a guide member, after drilling of the initial aperture, into one of the guide sleeves, down through the initial aperture in one adjacent vertebrae, through the intervertebral space and into the initial aperture in the other adjacent vertebrae; and

advancing an aperture-enlarging device over the guide member to enlarge the initial aperture.

15. The stabilizing device of claim 14 wherein the aperture enlarging device is one of a curved reamer, curved drill bit or coring device, and wherein said step of advancing includes advancing the one of the curved reamer, the curved drill bit or coring device over the guide member so as to form an arcuate aperture in each of the adjacent vertebrae.

16. The stabilizing method of claim 7 wherein the step of forming includes:

inserting a drill bit into each guide sleeve;
drilling an initial aperture in each of the adjacent vertebrae so as to create intersecting apertures with convergent paths within the intervertebral space;
inserting a guide member, after drilling of the initial aperture, into one of the guide sleeves, down through the initial aperture in one adjacent vertebrae, through the intervertebral space and into the initial aperture in the other adjacent vertebrae; and
advancing an aperture-enlarging device over the guide member to enlarge the initial aperture to form the aperture that receives the implant.

17. The stabilizing method of claim 16 wherein the aperture-enlarging device is one of a drill bit, a reamer, an awl or energy source.

18. The stabilizing method of claim 16 wherein the aperture enlarging device is one of a curved reamer, a curved drill bit, a curved drill or an energy source, and wherein the step of advancing includes advancing the one of the curved reamer,

the curved drill bit, the curved drill or the energy source over the guide member so as to form an arcuate aperture in each of the adjacent vertebrae, the arcuate apertures in the adjacent vertebrae having a common axis of rotation.

19. The stabilizing method of claim 7 wherein the positioning apparatus being provided further includes a cross member and an intervertebral spacer, where the guide sleeves are pivotally mounted to the cross member and the intervertebral spacer is spaced from the cross member and interconnected thereto at about a mid point between the pivot points for the guide sleeves; and wherein said stabilizing method further comprises:

locating the intervertebral spacer in the intervertebral space between the adjacent vertebrae; and

maintaining alignment of the guide sleeves with respect to the adjacent vertebrae so that a consistent angle is maintained between the guide sleeve and the vertebrae during at least a portion of said forming of the aperture.

20. The stabilizing method of claim 11 wherein the positioning apparatus being provided further includes an intervertebral spacer; said stabilizing method further comprises the step of locating the intervertebral spacer in the intervertebral space between the adjacent vertebrae; and wherein the intervertebral spacer is configured so as to provide protection to the spine during said drilling when disposed in the intervertebral space.

21. The stabilizing method of claim 8 wherein the step of implanting includes successively drawing a portion of the implant through the arcuate aperture in one adjacent vertebrae, through the intervertebral space and into the arcuate aperture of the other adjacent vertebrae.

22. The stabilizing method of claim 8 wherein the step of implanting includes:
securing one end of a guide wire to an end of the implant;
passing a free end of the guide wire through the arcuate aperture in one of the
adjacent vertebrae, through the intervertebral space and through the arcuate aperture in
the other adjacent vertebrae; and
pulling on the guide wire free end to thereby successively draw the portion of
the implant.

23. The stabilizing method of claim 8 wherein the step of implanting
includes:
inserting a beginning end of the implant into an entrance opening of one of the
adjacent vertebrae;
applying a force to the portion of the implant extending from the entrance
opening so as to drive the implant beginning end though the arcuate aperture in the
aperture of said one of the adjacent vertebrae, through the intervertebral space and into
the arcuate aperture in the other of the adjacent vertebrae.

24. The stabilizing method of claim 8 wherein the method further
comprises:
inserting a beginning end of the implant into an entrance opening of one of the
adjacent vertebrae; and
applying a force generated by a force generating mechanism to the portion of
the implant extending from the entrance so as to drive the implant beginning end
though the arcuate aperture in the aperture of said one of the adjacent vertebrae,
through the intervertebral space and into the arcuate aperture in the other of the
adjacent vertebrae.

25. The stabilizing method of claim 24 wherein the method further comprises:

locating an intervertebral spacer in the intervertebral space between the adjacent vertebrae; and

attaching the force generating mechanism to the intervertebral spacer.

26. The stabilizing method of claim 7 wherein the implant is made from one or more of a metal, bone, morphogenic protein, carbon fiber composite, nitinol or a biodegradable material.

27. The stabilizing method of claim 7 wherein the implant is one of solid, hollow or with ingrowth fenestrations.

28. The stabilizing method of claim 7 wherein one end of each guide sleeve, the end which contacts a surface of the adjacent vertebrae is configured to accept a surface feature of the adjacent vertebrae surface and includes surface artifacts that mechanically engage the adjacent vertebrae.

29. The stabilizing method of claim 7 wherein the implant includes a first and a second section and a distal end of each of the first and second sections being configured so as to be capable of being secured together; and wherein the method further comprises:

inserting the implant first section into the aperture in one of the adjacent vertebrae so that the distal end therefore is disposed in the intervertebral space;

inserting the implant second section into the aperture in one of the adjacent vertebrae so that the distal end therefore is disposed in the intervertebral space;

securing the distal ends of the first and second sections together.

30. The stabilizing method of claim 29 wherein the apertures in the adjacent vertebrae are arcuate and wherein the implant first and second sections are arcuate having a radius substantially the same as that for the arcuate apertures.

31. The stabilizing method of claim 29 wherein a long axis for each of the first and second sections is substantially straight.

32. The stabilizing method of claim 7, further comprising the step of securing a portion of the implant proximal the ends thereof to the adjacent vertebrae.

33. The stabilizing method of claim 29 wherein the step of securing the distal ends includes securing the distal ends by one of a nut, bolt, pin, staple, or expansion bolt.

34. An implantable spinal fixation system, comprising:
an arcuate implant member of a size sufficient to extend between two adjacent vertebrae.

35. The system of claim 34 wherein the implant member is constructed of one or more of a metal, bone, morphogenic protein, carbon fiber composite, nitinol or a biodegradable material.

36. A spinal system comprising:
a mammalian spine with a surgically implanted arcuate member extending between two adjacent vertebrae.

37. The system of claim 36 wherein the arcuate member is constructed of one or more of a metal, bone, morphogenic protein, carbon fiber composite, nitinol or a biodegradable material.

38. A spinal fusion kit comprising an arcuate fixation member.

39. A spinal fixation kit comprising a positioning apparatus including:
two guide sleeves, each guide sleeve having a long axis,
a cross member,
an intravertebral spacer,
wherein the guide sleeves are pivotably mounted to the cross member, and
wherein the intravertebral spacer is spaced from the cross member and
interconnected thereto so as to be between the pivot points for the guide
sleeves; and
a fixation member.

40. The spinal fixation kit of 39, wherein the fixation member is arcuate.

41. The spinal fixation kit of claim 40, wherein the fixation member is one
of a solid or hollow member.

42. The spinal fixation kit of claim 40, wherein the fixation member is
configured with at least one fenestration.

43. The spinal fixation kit of claim 39, wherein:
the fixation member includes a first section and a second section, a distal end
of each of the first and second sections being configured so as to be capable of being
secured together thereat; and
a mechanism that secures the distal ends of the first and second sections
together.

44. The spinal fixation kit of claim 39, further comprising a guide wire, an
end of the guide wire being configured to be interconnected to one end of the fixation
member, and the guide wire being used to implant the fixation member in adjacent
vertebrae.

45. The spinal fixation kit of claim 39, wherein the fixation member is made from one of a metal, bone, bone with bone morphogenic protein, carbon fiber composite, nitinol or a biodegradable material.

46. The spinal fixation kit of claim 39, further comprising a force generating device used to apply a force to the fixation member for implanting the fixation member in adjacent vertebrae.

47. A method for fixing two adjacent vertebrae to facilitate a bony union thereof, comprising:

performing a discectomy of an intervertebral space;

transecting a segment of bone from a surface of a vertebra bordering the intervertebral space;

freeing the segment of bone from the surface of the vertebra from a horizontal to a vertical plane;

securing the segment of bone in the vertical plane to span the intervertebral space, thereby fixing two adjacent vertebrae to facilitate a bony union thereof.

48. A method for stabilizing adjacent vertebrae of a spine, comprising:

providing a positioning apparatus including a pivot arm that is rotatable about a pivot point;

locating the positioning apparatus with respect to the adjacent vertebrae such that the pivot point is disposed between the adjacent vertebrae;

forming an aperture in each of the adjacent vertebrae responsive to rotation of the pivot arm about the pivot point; and

inserting an implant into the apertures formed in each of the adjacent vertebrae so that the implant extends between the adjacent vertebrae and through the intervertebral space.

49. The stabilizing method of claim 48 wherein said step of forming includes forming an arcuate aperture in each of the adjacent vertebrae.

50. The stabilizing method of claim 48 wherein the step of forming includes forming an aperture in each of the adjacent vertebrae by one of drilling or ablation of the bone by an energy source.

51. The stabilizing method of claim 48 wherein the step of locating includes locating the pivot point such that it is spaced from a surface of the adjacent vertebrae and disposed at a midpoint between the adjacent vertebrae.

52. The stabilizing method of claim 48 wherein the apparatus being provided further includes a drill that is affixed to the pivot arm such that when the pivot arm rotates about the pivot point the drill follows a defined arcuate cutting path.

53. The stabilizing method of claim 52 wherein the drill includes a curved drilling element.

54. The stabilizing method of claim 48 wherein the positioning apparatus further includes a frame to which the pivot arm is rotatably mounted and wherein the step of positioning includes securing the frame to the adjacent vertebrae so the pivot point is located at the desired position.

55. The stabilizing method of claim 51 wherein the pivot point is located opposite the intervertebral space.

56. The stabilizing method of claim 53 wherein the curved drilling element comprises a curved cannula, a flexible member disposed within the curved cannula, and a cutting burr affixed to an end of the flexible member, the flexible burr for cutting an arcuate aperture in each of the adjacent vertebrae.

57. The stabilizing method of claim 52 wherein the step of forming includes rotating the pivot arm in one direction to form the aperture in one of the adjacent vertebrae and rotating the pivot arm in an opposite direction so as to form the aperture in the other of the adjacent vertebrae.

58. The stabilizing method of claim 57 wherein the apparatus being provided further includes a drill that is affixed to the pivot arm such that when the pivot arm rotates about the pivot point the drill follows a defined arcuate cutting path, and wherein said step of forming further includes remounting the drill on the pivot arm prior to said rotating the pivot arm in the opposite direction so that the drill is positioned for forming the aperture in said other of the adjacent vertebrae.

59. The stabilizing method of claim 57 wherein the drill is a curved drill.

60. A method for stabilizing adjacent vertebrae of a spine, comprising: providing a cutting device including a cutting implement having midpoint; positioning the cutting device proximal a surface of the adjacent vertebrae and so that the cutting implement midpoint is located between the adjacent vertebrae; cutting a common channel in the adjacent vertebrae with the cutting implement; and

inserting a biscuit implant into the common channel so that the implant extends between the adjacent vertebrae and through the intervertebral space, the space between the adjacent vertebrae.

61. The stabilizing method of claim 60 wherein the cutting device being provided is configured such that the cutting implement is moveable between a first position in which the cutting implement is disposed within the cutting device and a second position in which a portion of the cutting implement extends outside of the cutting device and wherein the step of cutting includes moving the cutting implement to the second position to cut the common channel in the adjacent vertebrae.

62. The stabilizing method of claim 60 wherein the biscuit implant includes a spacer element and wherein the step of inserting includes inserting the biscuit implant into the common channel such that the spacer element is disposed in the intervertebral space.

63. The stabilizing method of claim 60 wherein the step of positioning includes positioning the cutting device so the cutting implement midpoint is located at the midpoint between the adjacent vertebrae

64. A spinal fixation kit comprising a cutter bracket sub-system and a fixation member, wherein the cutter bracket sub-system includes:

a frame being configured so as to be removably securable to adjacent vertebrae, and
a pivot arm rotatably mounted to the frame.

65. The spinal fixation kit of claim 64 further comprising one of a drill or an ablation energy source.

66. The spinal fixation kit of claim 64 further includes a drill and wherein the pivot arm and the drill are configured so the drill is removably secured to the pivot arm.

67. The spinal fixation kit of claim 66 wherein the drill includes a curved drilling element.

68. The spinal fixation kit of claim 67 wherein the curved drilling element includes a curved cannula, a flexible member disposed within the curved cannula, and a cutting burr affixed to an end of the flexible member, the flexible burr being configured for cutting an arcuate aperture in a vertebrae.

69. A spinal fixation kit comprising a cutting device and a fixation member, wherein the cutting device includes a cutting element that is moveable from a first position in which the cutting element is disposed within a housing of the device and a second position in which a portion of the cutting element is disposed outside of the device housing.

70. The spinal fixation kit of claim 69 wherein the cutting element is a circular blade.

71. The spinal fixation kit of claim 70 wherein the fixation member is a biscuit implant configured to complement the shape formed by the cutting circular blade.

72. The spinal fixation kit of claim 70 wherein the fixation member includes a spacer element configured so as to be capable of being received in an intervertebral space between adjacent vertebrae.

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